VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a Minor, Industrial permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq. The discharge results from poultry processing (slaughter, cut-up, and packaging), poultry processing for pet food, and plant cleanup. This permit action consists of reissuance and establishment of all applicable effluent limitations and monitoring requirements.

1. Facility Name and Address: SIC Code: 2015

   Tyson Foods, Inc.
   13264 Mountain Road
   Glen Allen, Virginia 23059

   Location: 13264 Mountain Road, Hanover County

2. Permit No. VA0004031 Existing Permit Expiration Date: December 2, 2004

3. Owner Contact: Name: Mr. Steve Dugent Title: Complex Environmental Manager
   Telephone No: (804) 798-8357, ext. 305

4. Application Complete Date: November 5, 2004
   Permit Drafted By: Clinton T. Shettle Date: March 30, 2005
   Piedmont Regional Office
   Reviewed By: Curtis Linderman Date: July 21, 2005
   Public Comment Period Dates: from Oct. 4, 2005 to Nov. 2, 2005

5. Receiving Stream Name: Chickahominy River / UT
   River Mile: 2-XDD001.49
   Basin: James River (Lower)
   Subbasin: N/A
   Section: 4
   Class: III
   Special Standards: m
   7-Day, 10-Year Low Flow: 0 MGD
   1-Day, 10-Year Low Flow: 0 MGD
   30-Day, 5-Year Low Flow: 0 MGD
   Harmonic Mean Flow: 0 MGD
   Tidal? NO
   On 303(d) list? YES
   Attachment A – Flow Frequency Determination

6. Operator License Requirements: Class II

7. Reliability Class: N/A

8. Permit Characterization:
   (X) Private ( ) Federal ( ) State ( ) POTW

   ( ) Possible Interstate Effect ( ) Interim Limits in Other Document

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters. The limitations in this permit were developed in accordance with § 303(d)(4) of the Clean Water Act. Therefore, antidegradation restrictions do not apply.

The antidegradation review begins with a Tier determination. The UT Chickahominy River is determined to be a Tier 1 waterbody because it is listed as impaired on the Virginia's Section 303(d) Total Maximum Daily Load Priority List and Report due to violations of the General Standards (Benthics) (VADEQ 1998 and 2002).

15. Site Inspection: Date January 4, 2004 Performed by Clinton T. Shettle

16. Effluent Screening & Limitation Development:

Basis for Effluent Limitations – Outfall 001

PARAMETER	BASIS
pH	State Water Quality Standards
BOD5	Chickahominy Water Standards
Total Suspended Solids (TSS)	Chickahominy Water Standards
TRC	Water Quality Based Effluent Limitations (WQBEL)
Fecal Coliform (CFU/100 ml)	ELG - BPT
DO	State Water Quality Standards
Total P	Chickahominy Water Standards
Total N	Best Available Technology economically achievable (BAT) effluent limitations from EPA's 40 CFR Part 432.113, final rule. The facility's max. 30-day ave. product production level is 18.5 million lbs./month (over the ELG threshold of 100 million lbs./year).
Ammonia-N	Chickahominy Water Standards and 40 CFR Part 432.112 (Subpart K)
E. coli (CFU/100 ml)	State Water Quality Standards
TKN	Guidance Memo. 05-2009, VPDES Nutrient Limitations for Significant Dischargers to the Chesapeake Bay (GM 05-2009)
Zinc	State Water Quality Standards
Settleable Solids	Chickahominy Water Standards
Oil & Grease (as n-hexane extractable material, HEM)	Best Practicable Control Technology currently available (BPT) from 40 CFR Part 432.112, final rule and 40 CFR Part 136.3
Total Phosphorus-Monthly	GM 05-2009
Total Phosphorus-year-to-date	GM 05-2009
Total Phosphorus-calendar year	TMDL (VA SWCB approved 3/15/05)
Orthophosphate	GM 05-2009

D.4. **Nutrient Enriched Waters/Chesapeake Bay Nutrients Reopener**
Rationale: Rationale: Policy for Nutrient Enriched Waters, 9 VAC 25-40-10 allows reopening of permits for discharges into waters designated as nutrient enriched if total phosphorus and total nitrogen in a discharge potentially exceed specified concentrations. The policy anticipates that future total phosphorus and total nitrogen limits may be needed.

D.5. **Water Quality Criteria Reopener**
Rationale: VPDES Permit Regulation, 9VAC 25-31-220 D requires effluent limitations to be established which will contribute to the attainment or maintenance of water quality criteria.

D.6. **Notification Levels**
Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 A for all manufacturing, commercial, mining, and silvicultural dischargers.

D.7. **Compliance Reporting Under Part I A**
Rationale: Authorized by VPDES Permit Regulation, 9 VAC 25-31-190 J 4 and 220 I. This condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

D.8. **Groundwater Monitoring**
Rationale: State Water Control Law § 62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. Ground water monitoring for parameters of concern will indicate whether possible lagoon seepage is resulting in violations to the State Water Control Board's Ground Water Standards. (see **Attachment H**)

D.9. **Total Maximum Daily Load (TMDL) Reopener**
Rationale: Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The re-opener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed it they are the result of a TMDL, basin plan, or other wasteload allocation prepared under section 303 of the Act.

D.10. **General Permit Clause**
Rationale: The Virginia General Assembly, in their 2005 session, enacted a new Article 4.02 (Chesapeake Bay Watershed Nutrient Credit Exchange Program) to the Code of Virginia to address nutrient loads to the Bay. Section 62.1-44.19:14 of the law requires the development of a watershed general permit that authorizes point source discharges of total nitrogen and total phosphorus and provides for the control of those nutrients in lieu of the individual VPDES permits, unless the individual permits contain more restrictive limits that are necessary to protect local water quality. That section of the law also sets forth various items to be contained within the general permit. Section 62.1-44.19:15 sets forth the requirements for new and expanded dischargers which are captured by the requirements of law.

21. Changes to Permit:

CHANGES TO OUTFALL 001, PART I.A						
Parameter	Effluent Limits		Monitoring Requirements		Reason	Date
	From	To	From	To		
001 Flow (MGD)	-	-	Cont. Rec'd 1/We.	TIRE Contin -uous	Clarification. The facility's flow measuring equipment is the "TIRE" type.	
006 F.Col. (CFU/100 ml.)	- -	NL Ave. 400Max	-	-	ELG-40 CFR Part 432.112	1/05
013 TN (mg/l)	-	103 Ave 147Max	-	-	ELG-40 CFR Part 432	9/04
013 TN (kg/d)	-	487 Ave 695Max	-	-	ELG - 40 CFR Part 432	9/04
006 F.Col. (CFU/100 ml.) 120 E.coli (#/100ml.)	200 Geo. mean Fecal coliform	126 Geo. mean E. coli	-	-	Reflects changes in bacterial monitoring from Fecal Coliform to E. coli. (GM03-2007).	3/03
039 Ammonia (as N) (mg/l)	-	8.0 Max.	-	-	40 CFR 432.112 (Subpart K) Daily Max. requirement combined with Chickahominy Standards Mo.Ave. requirement.	1/05
068 TKN	-	NL Mo.Ave	-	2/Mo.	Guidance Memo. 05-2009	5/05
196 Zinc (ug/l) Tot. recov.	-	190 Ave & Max	-	-	WQS, 9VAC25-260, see attached MSTRANTI and STATS analyses.	2/04
389 Nitrate + Nitrite (as N)	-	NL Ave	-	2/Mo.	Guidance Memo. 05-2009	5/05
500 O&G (mg/l)	10 Ave. 15 Max.	- -	1/We.	-	Replaced by O&G (as HEM) monitoring as per 40 CFR Part 432.112 and Part 136.3	1/05
791 TN kg/Mo.	-	NL Max	-	1/Mo.	Guidance Memo. 05-2009	5/05

--	D.9	Total Maximum Daily Load (TMDL) Reopener - Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. UT Chickahominy is impaired. The TMDL was adopted by the State Water Control Board 3/15/05.
--	D.10-D.13	Added to reflect GM05-2009: VPDES Nutrient Limitations for Significant Discharges to the Chesapeake Bay Watershed.
--	D.14	Schedules of Compliance for E.coli, Zinc, and TMDL Limits
C	E	WET – reflects new guidance for Whole Effluent Toxicity testing (GM00-2012)

22. Variances/Alternate Limits or Conditions: None

23. Public Notice Information required by 9 VAC 25-31-280 B:
All pertinent information is on file and may be inspected or copied by contacting Clinton T. Shettle at:

Piedmont Regional Office
4949-A Cox Rd
Glen Allen, VA 23060
(804) 527-5032
ctshettle@deq.virginia.gov

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

24. Additional Comments:

Staff Comments:

a. Reduced monitoring was not evaluated for this facility due to Warning Letters issued: February 4, 2004 (WL #W2004-01-P-1008), November 19, 2003 (WL #W2003-10-P-1009), and June 18, 2002 (WL #W2002-05-P-1011).

b. The Lagoon Closure Plan contained in the current permit (Part I.D.7 and reissued through Part I.D.1) is continued in this reissuance and enclosed. (see **Attachment I**) The lagoons on site are intact, contain water, solids and are being considered for future enhancement of nutrient removal.

c. The Groundwater Remediation Plan contained in the current permit is continued in this reissuance. Groundwater well monitoring results were analyzed for significant differences from the upgradient well using T-tests and non-parametric tests (see **Attachment H**)

ATTACHMENT A

- **Flow Frequency Determination**
- **Flow Frequency Determination request**

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4949-A Cox Road, Glen Allen, VA 23060-6296 804/527-5020

SUBJECT: **Flow Frequency Analysis Request**

TO: **Jennifer V. Palmore**

FROM: **Clinton T. Shettle**

DATE: **August 31, 2004**

Please provide flow frequencies at the locations listed below. I have attached the following:
A copy of the previous Flow Frequency Determination (if applicable).
A copy of a topo map showing the location of each existing outfall & any new or proposed outfalls.

Facility Name: Tyson Foods, Inc. - Glen Allen Permit Number: VA0004031

Permit Type: Major (Minor) (Industrial) Municipal Individual Stormwater Other_____
(circle all that apply)

Permit Action: Issuance _____ Reissuance ✓ Modification _____

Current Expiration Date: December 2, 2004

Topo Map: Glen Allen (127 A)

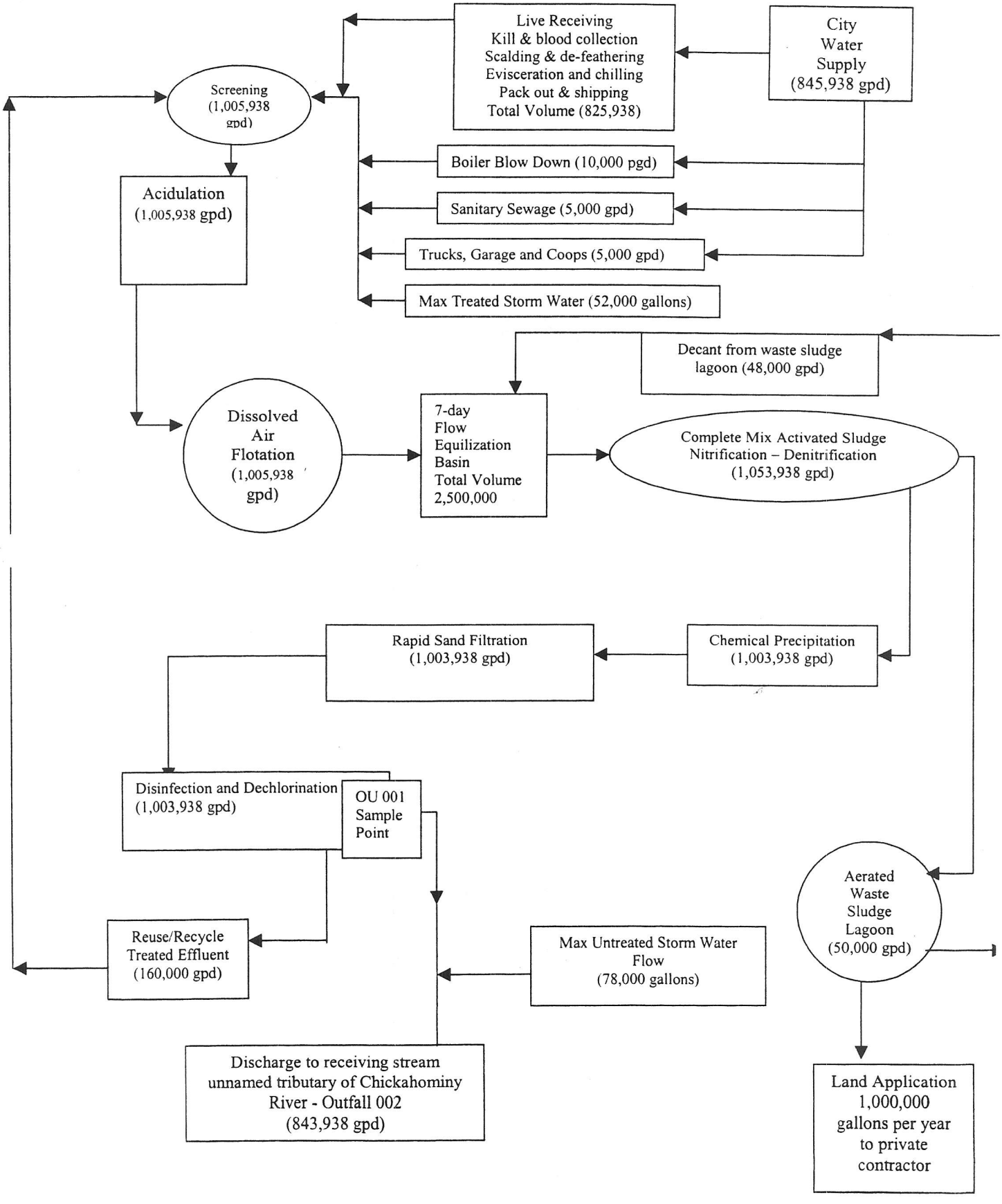
Outfall Description:

	#	Latitude	Longitude	Receiving Stream
a.	001	37° 41' 57" N	77° 33' 03" W	Unnamed Tributary (UT) Chickahominy River
b.	002	37° 41' 47" N	77° 33' 02" W	Unnamed Tributary (UT) Chickahominy River
c.	_____	_____	_____	_____
d.	_____	_____	_____	_____

Comments:

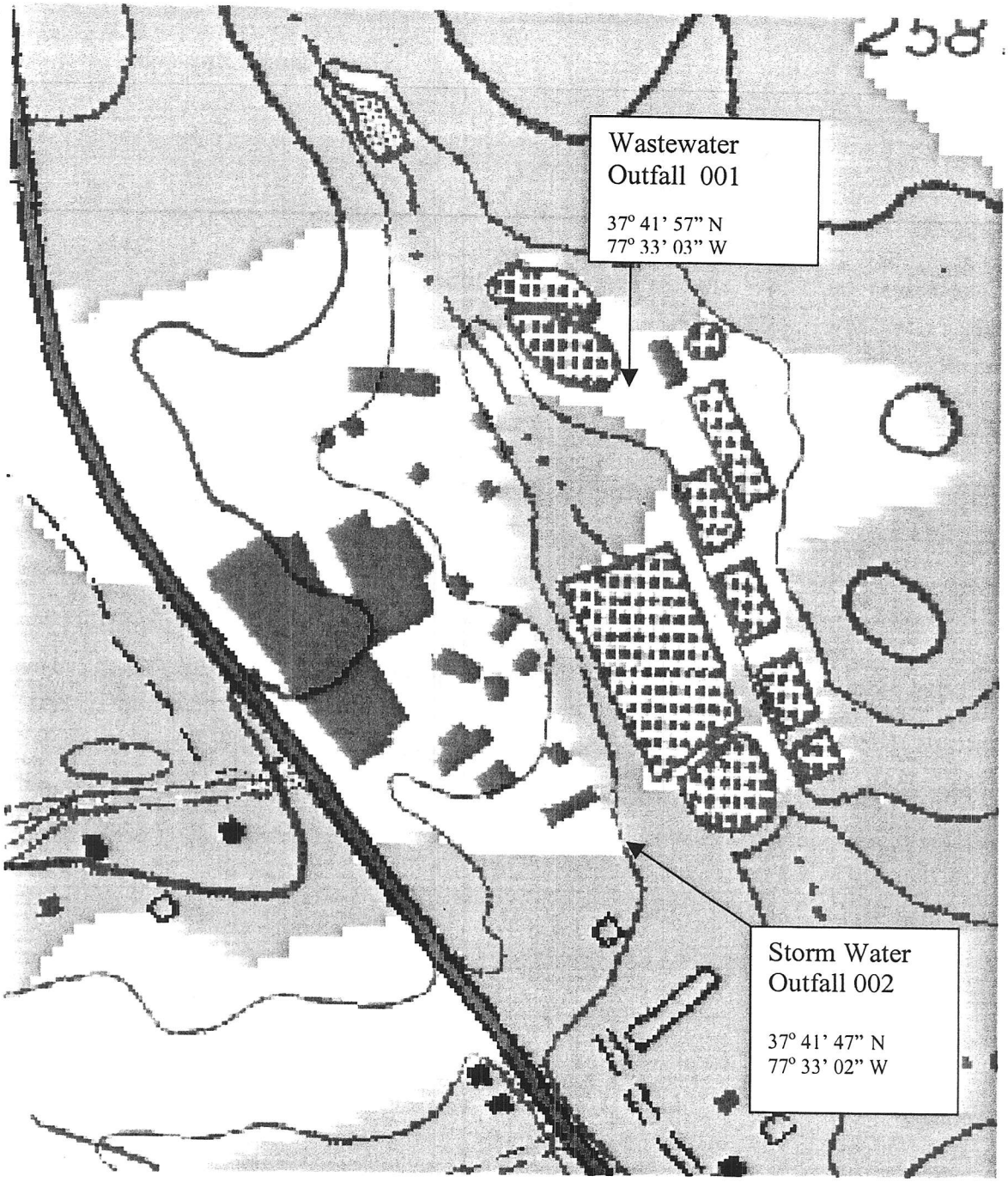
A TMDL is under development for this Unnamed Tributary (UT) of the Chickahominy River.
Thanks

Tyson Foods, Inc.
Glen Allen, VA Line Drawing



ATTACHMENT C

- **Glen Allen topographical maps**



Map center is 37° 41' 53"N, 77° 33' 05"W (NAD27)
Glen Allen quadrangle
Projection is UTM Zone 18 NAD83 Datum

M=-10.112
G=-1.561

Tyson Foods, Inc.
Glen Allen Processing Plant

ATTACHMENT D

- **Facility pH Data**

ATTACHMENT E

- **MSTRANTI and STATS printouts**

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Tyson Foods, Inc. - Glen Allen

Permit No.: VA0004031

Receiving Stream: UT of Chickahominy River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	173.1 mg/L
90% Temperature (Annual) =	28 deg C
90% Temperature (Wet season) =	deg C
90% Maximum pH =	7.4 SU
10% Maximum pH =	6.9 SU
Tier Designation (1 or 2) =	1
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows

1Q10 (Annual) =	0 MGD
7Q10 (Annual) =	0 MGD
30Q10 (Annual) =	0 MGD
1Q10 (Wet season) =	0 MGD
30Q10 (Wet season)	0 MGD
30Q5 =	0 MGD
Harmonic Mean =	0 MGD
Annual Average =	0 MGD

Mixing Information

Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	173.1 mg/L
90% Temp (Annual) =	28 deg C
90% Temp (Wet season) =	deg C
90% Maximum pH =	7.4 SU
10% Maximum pH =	6.9 SU
Discharge Flow =	1.25 MGD

arameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
ıg/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
cenapthene	0	--	--	na	2.7E+03	--	--	na	2.7E+03	--	--	--	--	--	--	--	--	--	--	na	2.7E+03
crolein	0	--	--	na	7.8E+02	--	--	na	7.8E+02	--	--	--	--	--	--	--	--	--	--	na	7.8E+02
crylonitrile [c]	0	--	--	na	6.6E+00	--	--	na	6.6E+00	--	--	--	--	--	--	--	--	--	--	na	6.6E+00
drin [c]	0	3.0E+00	--	na	1.4E-03	3.0E+00	--	na	1.4E-03	--	--	--	--	--	--	--	--	3.0E+00	--	na	1.4E-03
mmonia-N (mg/l) early)	0	2.30E+01	1.98E+00	na	--	2.3E+01	2.0E+00	na	--	--	--	--	--	--	--	--	--	2.3E+01	2.0E+00	na	--
mmonia-N (mg/l) gh Flow)	0	2.30E+01	#VALUE!	na	--	2.3E+01	#######	na	--	--	--	--	--	--	--	--	--	2.3E+01	#VALUE!	na	--
thracene	0	--	--	na	1.1E+05	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	--	--	na	1.1E+05
timony	0	--	--	na	4.3E+03	--	--	na	4.3E+03	--	--	--	--	--	--	--	--	--	--	na	4.3E+03
enic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	3.4E+02	1.5E+02	na	--
ium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
zene [c]	0	--	--	na	7.1E+02	--	--	na	7.1E+02	--	--	--	--	--	--	--	--	--	--	na	7.1E+02
zidine [c]	0	--	--	na	5.4E-03	--	--	na	5.4E-03	--	--	--	--	--	--	--	--	--	--	na	5.4E-03
zo (a) anthracene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
zo (b) fluoranthene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
zo (k) fluoranthene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
zo (a) pyrene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	--	--	na	1.4E+01
-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	--	--	na	1.7E+05
loform [c]	0	--	--	na	3.6E+03	--	--	na	3.6E+03	--	--	--	--	--	--	--	--	--	--	na	3.6E+03
benzylphthalate	0	--	--	na	5.2E+03	--	--	na	5.2E+03	--	--	--	--	--	--	--	--	--	--	na	5.2E+03
ium	0	7.3E+00	1.7E+00	na	--	7.3E+00	1.7E+00	na	--	--	--	--	--	--	--	--	--	7.3E+00	1.7E+00	na	--
n Tetrachloride [c]	0	--	--	na	4.4E+01	--	--	na	4.4E+01	--	--	--	--	--	--	--	--	--	--	na	4.4E+01
dane [c]	0	2.4E+00	4.3E-03	na	2.2E-02	2.4E+00	4.3E-03	na	2.2E-02	--	--	--	--	--	--	--	--	2.4E+00	4.3E-03	na	2.2E-02
de	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	8.6E+05	2.3E+05	na	--
	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.9E+01	1.1E+01	na	--
benzene	0	--	--	na	2.1E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	--	--	na	2.1E+04

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	--	--	na	2.9E+04
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	--	--	na	3.7E+02
Fluorene	0	--	--	na	1.4E+04	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	--	--	na	1.4E+04
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	--	1.0E-02	na	--
Heptachlor [c]	0	5.2E-01	3.8E-03	na	2.1E-03	5.2E-01	3.8E-03	na	2.1E-03	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	2.1E-03
Heptachlor Epoxide [c]	0	5.2E-01	3.8E-03	na	1.1E-03	5.2E-01	3.8E-03	na	1.1E-03	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	1.1E-03
Hexachlorobenzene [c]	0	--	--	na	7.7E-03	--	--	na	7.7E-03	--	--	--	--	--	--	--	--	--	--	na	7.7E-03
Hexachlorobutadiene [c]	0	--	--	na	5.0E+02	--	--	na	5.0E+02	--	--	--	--	--	--	--	--	--	--	na	5.0E+02
Hexachlorocyclohexane Alpha-BHC [c]	0	--	--	na	1.3E-01	--	--	na	1.3E-01	--	--	--	--	--	--	--	--	--	--	na	1.3E-01
Hexachlorocyclohexane Beta-BHC [c]	0	--	--	na	4.6E-01	--	--	na	4.6E-01	--	--	--	--	--	--	--	--	--	--	na	4.6E-01
Hexachlorocyclohexane Gamma-BHC [c] (Lindane)	0	9.5E-01	na	na	6.3E-01	9.5E-01	--	na	6.3E-01	--	--	--	--	--	--	--	--	9.5E-01	--	na	6.3E
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	--	--	na	1.7E
Hexachloroethane [c]	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	--	--	na	8.9E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	--	2.0E+00	na	--
Indeno (1,2,3-cd) pyrene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone [c]	0	--	--	na	2.6E+04	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	--	--	na	2.6E+04
Lepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	2.4E+02	2.7E+01	na	--	2.4E+02	2.7E+01	na	--	--	--	--	--	--	--	--	--	2.4E+02	2.7E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	1.4E+00	7.7E-01	na	5.1E-02	--	--	--	--	--	--	--	--	1.4E+00	7.7E-01	na	5.1E-02
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	--	--	na	4.0E+03
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	--	3.0E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	--	--	na	2.1E+04
Nickel	0	2.9E+02	3.2E+01	na	4.6E+03	2.9E+02	3.2E+01	na	4.6E+03	--	--	--	--	--	--	--	--	2.9E+02	3.2E+01	na	4.6E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	1.9E+03
Nitrosodimethylamine [c]	0	--	--	na	8.1E+01	--	--	na	8.1E+01	--	--	--	--	--	--	--	--	--	--	na	8.1E+01
Nitrosodiphenylamine [c]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	--	--	na	1.6E+02
Nitrosodi-n-propylamine [c]	0	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	--	--	na	1.4E+01
Nonthion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	6.5E-02	1.3E-02	na	--
PCB-1016	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1221	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1232	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1242	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1248	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1254	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1260	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-Total [c]	0	--	--	na	1.7E-03	--	--	na	1.7E-03	--	--	--	--	--	--	--	--	--	--	na	1.7E-03

3/31/2005 3:28:46 PM

Facility = Tyson Foods, Inc. - Glen Allen
Chemical = Chloride
Chronic averaging period = 4
WLAa = 860000 ug/L
WLAc = 230000 ug/L
Q.L. = 1000 ug/L
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 90000
Variance = 2916000
C.V. = 0.6
97th percentile daily values = 219007.
97th percentile 4 day average = 149741.
97th percentile 30 day average= 108544.
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

90000 ug/L ← Data taken from Feb 4, 1999 reissued Certificate of Analysis from Enviro Compliance Labs., Inc.

7/28/2005 5:41:53 PM

Facility = Tyson Foods, Inc. - Glen Allen
Chemical = Zinc
Chronic averaging period = 4
WLAa = 190 ug/L
WLAc = 190 ug/L
Q.L. = 0.01
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 134
Variance = 6464.16
C.V. = 0.6
97th percentile daily values = 326.077
97th percentile 4 day average = 222.947
97th percentile 30 day average= 161.611
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 190
Average Weekly limit = 190
Average Monthly LImit = 190

The data are:

134 ug/L ← Data taken from 5/24/04 Primary Laboratories, Inc. Analytical Laboratory Report using samples taken 5/21/04.

Facility = Tyson Foods, Inc.-Glen Allen
Chemical = Nickel (w/ Clean Metals Sampling)
Chronic averaging period = 4
WLAa = 290 ug/L
WLAc = 32 ug/L
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 2.5
Variance = 2.25
C.V. = 0.6
97th percentile daily values = 6.08354
97th percentile 4 day average = 4.15947
97th percentile 30 day average= 3.01513
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

2.5 ug/L ← Data taken from Albion Environmental, College Station TX.
... Clean Metals Study using samples taken 7/12 & 7/13/99.

ATTACHMENT F

- **Whole Effluent Toxicity (WET) Testing memorandum and information**

DATA SUMMARY

Acute Toxicity Tests using Pimephales promelas

Outfall 001

TEST DATE	LC_{50}	PERCENT SURVIVAL IN 100% EFFLUENT	LABORATORY
1st Annual – May 2000	>100%	100%	Water Technologies and Controls, Inc
2nd Annual – June 2001	>100%	100%	Meritech, Inc.
3rd Annual – June 2002	>100%	100%	Meritech, Inc.
4th Annual – June 2003	>100%	100%	Meritech, Inc.
5th Annual – June 2004	>100%	100%	Meritech, Inc.

Chronic Toxicity Tests using Ceriodaphnia dubia, IWC 100%

Outfall 001

TEST DATE	Test Result NOEC SURV/REPRO	LABORATORY
1st Annual – May 2000	100/100	Water Technologies and Controls, Inc
2nd Annual – June 2001	100/100	Meritech, Inc.
3rd Annual – June 2002	100/100	Meritech, Inc.
4th Annual – June 2003	100/90	Meritech, Inc.
5th Annual – May 2004	100/50	Meritech, Inc.
5th Annual retest – June 2004	100/100	Meritech, Inc.

CONCLUSION AND RECOMMENDATION

Results of the acute whole effluent toxicity tests performed on samples since the permit reissuance in 1999 to 2004 indicate compliance with the TMP in the current permit. During this time period, all tests resulted in an LC_{50}>100%. No further testing for acute toxicity will be required.

Chronic testing performed by the facility in 2003 and 2004 has indicated reproductive NOEC concentrations of 90% and 50%. The 2004 test resulting in 50% was retested with 100% survival and reproduction; however, the 2003 test of 90% was not retested, which would indicate noncompliance with the permit. Statistical evaluation of the data would indicate that a limit of an NOEC ≥ 69% (1.44 TUc) is needed. Five of six of the annual chronic tests meet the proposed limit, but given the sensitivity of the statistics when used on data where there is "0" flow in the receiving stream and less than 10 data points, it will not be included at this time. Instead, it is recommended that the current annual chronic test frequency be increased to quarterly throughout the life of the permit, alternating between the chronic 3-brood static renewal survival and reproduction test with *Ceriodaphnia dubia* and the 7-day survival and

DRAFT WHOLE EFFLUENT TOXICITY (WET) TESTING LANGUAGE FOR VPDES PERMIT NO. VA0004031

E. WHOLE EFFLUENT TOXICITY (WET) TESTING

1. Biological Monitoring

In accordance with the schedule outlined in Part I.E.2., the permittee shall conduct quarterly chronic toxicity tests for the duration of the permit. The permittee shall collect 24-hour flow-proportioned composite samples of final effluent from outfall 001.

a. The chronic tests to use are:

Chronic 3-Brood Static Renewal Survival and Reproduction Test using *Ceriodaphnia dubia* (for quarters in odd numbered years)

Chronic 7-Day Static Renewal Survival and Growth Test using *Pimephales promelas* (for quarters in even numbered years)

These chronic tests shall be conducted in such a manner and at sufficient dilutions (minimum of five dilutions, derived geometrically) to determine the "No Observed Effect Concentration" (NOEC) for survival and reproduction or growth. Results that cannot be determined (i.e., a "less than" NOEC value) are not acceptable, and a retest will have to be performed within the compliance period for which the test was performed. Report the LC_{50} at 48 hours and the IC_{25} with the NOEC's in the test report.

b. The test dilutions should be able to determine compliance with the following endpoint:

Chronic NOEC of 69% equivalent to a TU_c of 1.44

The permittee may provide additional samples to address data variability. These data shall be reported and may be included in the evaluation of effluent toxicity. Test procedures and reporting shall be in accordance with the WET testing methods cited in 40CFR 136.3.

c. The permit may be modified or revoked and reissued to include pollutant specific limits should it be demonstrated that toxicity is due to specific parameters. The pollutant specific limits must control the toxicity of the effluent.

6/13/2005 4:50:21 PM

Facility = Tyson Foods, Inc.-Glen Allen
Chemical = Chronic WET with C. Dubia
Chronic averaging period = 4
WLAa = 3
WLAc = 1
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 6
Expected Value = 1.185
Variance = .505521
C.V. = 0.6
97th percentile daily values = 2.88359
97th percentile 4 day average = 1.97159
97th percentile 30 day average= 1.42917
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 1.46257478405323
Average Weekly limit = 1.46257478405323
Average Monthly LImit = 1.46257478405323

The data are:

1
1
1
1
2
1.11

NPDES PERMIT RATING WORK SHEET

NPDES NO. VA0004031

Regular Addition
DiscretionaryAddition
Score change, but no status change
Deletion

Facility Name: Tyson Foods, Inc. Glen Allen

City: Glen Allen, (Hanover County)

Receiving Water: UT Chickahominy River

Reach Number: _____

Is this facility a steam electric power plant (SIC=4911) with one or more of the following characteristics?
1. Power output 500 MW or greater (not using a cooling pond/lake)
2. A nuclear power plant
3. Cooling water discharge greater than 25% of the receiving stream's 7Q10 flow rate

YES: score is 600 (stop here) ☒ NO (continue)

Is this permit for a municipal separate storm sewer serving a population greater than 100,000?

YES; score is 700 (stop here)
☒ NO (continue)

FACTOR 1: Toxic Pollutant Potential

PCS SIC Code: _____ Primary SIC Code: 2015 Other SIC Codes:
Industrial Subcategory Code: 4 (Code 000 if no subcategory)

Determine the Toxicity potential from Appendix A. Be sure to use the TOTAL toxicity potential column and check one)

Toxicity Group	Code	Points
No process waste streams	0	0
☒ 1.	1	5
2.	2	10
3.	3	15
4.	4	20
5.	5	25
6.	6	30
7.	7	35
8.	8	40
9.	9	45
10.	10	50

Code Number Checked: 1

Total Points Factor 1: 5

FACTOR 2: Flow/Stream Flow Volume (*Complete either Section A or Section B; check only one)*

Section A Wastewater Flow Only Considered

Wastewater Type (See Instructions)	Code	Points
Type I: Flow < 5 MGD	11	0
Flow 5 to 10 MGD	12	10
Flow > 10 to 50 MGD	13	20
Flow > 50 MGD	14	30
Type II: Flow < 1 MGD	21	10
Flow 1 to 5 MGD	22	20
Flow > 5 to 10 MGD	23	30
Flow > 10 MGD	24	50
Type III: Flow < 1 MGD	31	0
Flow 1 to 5 MGD	32	10
Flow > 5 to 10 MGD	33	20
Flow > 10 MGD	34	30

Section B Wastewater and Stream Flow Considered

Wastewater Type (See Instructions)	Percent of instream Wastewater Concentration at Receiving Stream Low Flow		Code	Points
Type I/III:	< 10 %		41	0
	10 % to < 50 %		42	10
	> 50 %		43	20
Type II:	< 10 %		51	0
	10 % to <50 %		52	20
	> 50 %	☒	53	30

Code Checked from Section A or B: 53

Total Points Factor 2: 30

FACTOR 5: Water Quality Factors

NPDES NO. VA0004031

A. *Is (or will) one or more of the effluent discharge limits based on water quality factors of the receiving stream (rather than technology-based federal effluent guidelines, or technology-based state effluent guidelines), or has a wasteload allocation been assigned to the discharge:*

		Code	Points
☒	Yes	1	10
	No	2	0

B. *Is the receiving water in compliance with applicable water quality standards for pollutants that are water quality limited in the permit?*

		Code	Points
☒	Yes	1	0
	No	2	5

C. *Does the effluent discharged from this facility exhibit the reasonable potential to violate water quality standards due to whole effluent toxicity?*

		Code	Points
☒	Yes	1	10
	No	2	0

Code Number Checked: A 1 B 1 C 1

Points Factor 5: A 10 + B 0 + C 10 = 20 TOTAL

FACTOR 6: Proximity to Near Coastal Waters

A. *Base Score: Enter flow code here (from Factor 2):* 53

Enter the multiplication factor that corresponds to the flow code: 0.6

Check appropriate facility HPRI Code (from PCS):

	HPRI#	*Code*	*HPRI Score*
	1	1	20
	2	2	0
	3	3	30
☒	4	4	0
	5	5	20

Flow Code	*Multiplication Factor*
11, 31, or 41	0.00
12, 32, or 42	0.05
13, 33, or 43	0.10
14 or 34	0.15
21 or 51	0.10
22 or 52	0.30
23 or 53	0.60
24	1.00

HPRI code checked: 4

Base Score: (HPRI Score) 0 X (Multiplication Factor) 0.6 = 0 (TOTAL POINTS)

B. *Additional Points NEP Program*
For a facility that has an HPRI code of 3, does the facility discharge to one of the estuaries enrolled in the National Estuary Protection (NEP) program (see instructions) or the Chesapeake Bay?

	Code	Points
Yes	1	10
No	2	0

C. *Additional Points Great Lakes Area of Concern*
For a facility that has an HPRI code of 5, does the facility discharge any of the pollutants of concern into one of the Great Lakes' 31 areas of concern (see Instructions)

	Code	Points
Yes	1	10
☒ No	2	0

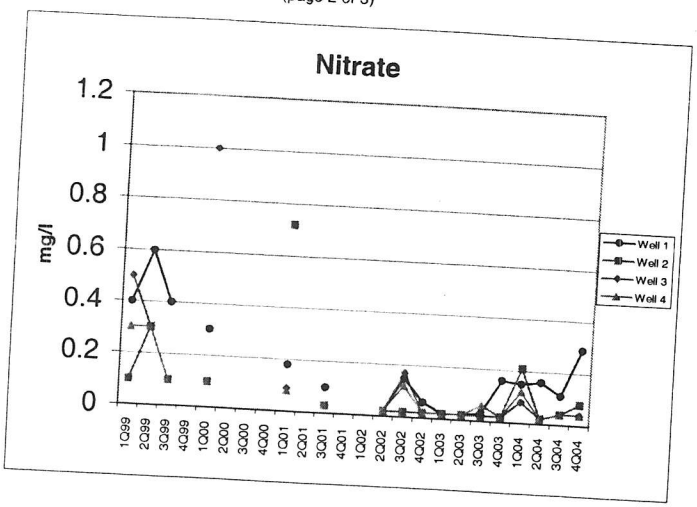
Code Number Checked: A 4 B __ C 2

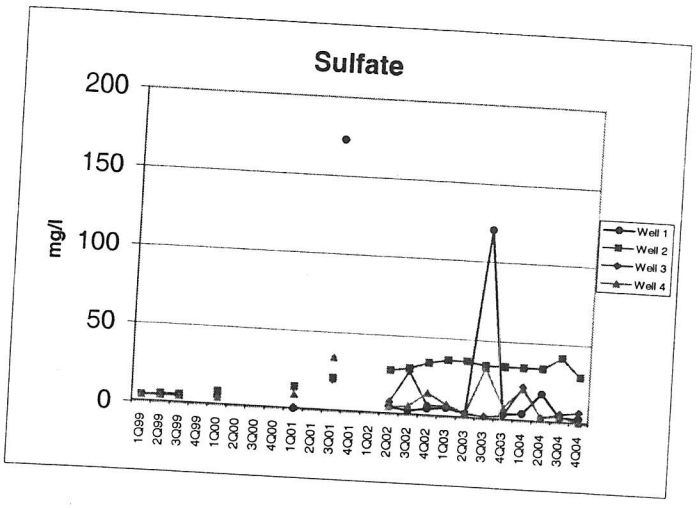
Points Factor 6: A 0 + B __ + C 0 = 0 TOTAL

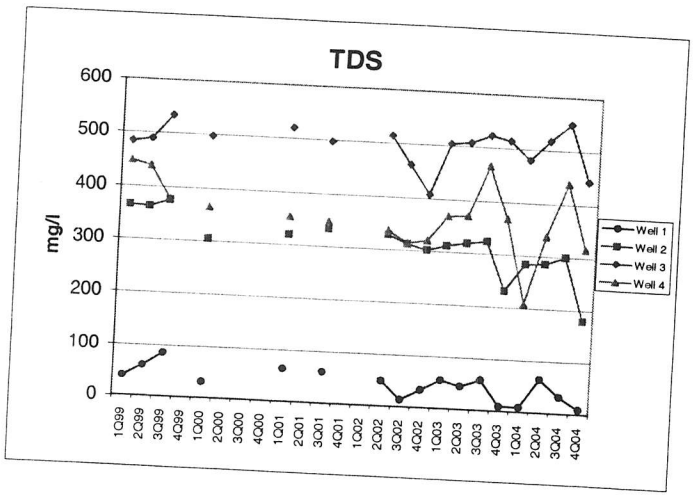
ATTACHMENT H

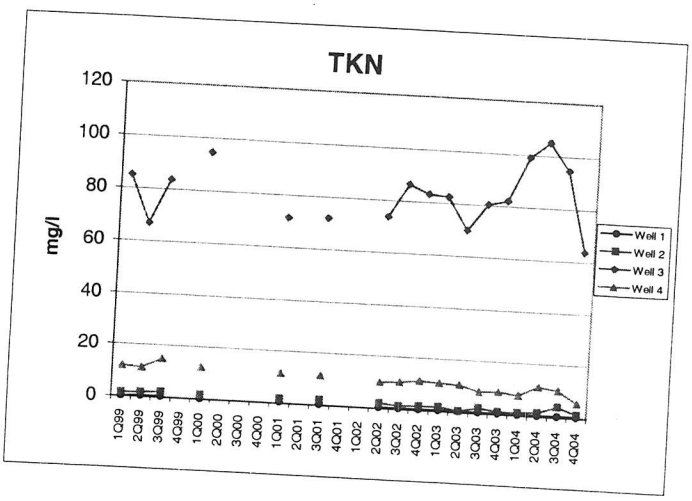
- Groundwater data evaluation
- Groundwater Remediation Plan (1/9/92 approval & 10/21/91 supplemental letter)
- 10/21/91 Groundwater contour map

Tyson Foods, Inc. - Glen Allen (VA0004031)
GW data trend graphs (page 2 of 3)









Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number	VA0004031
Facility Name	Tyson Foods, Inc.-Glen Allen
Parameter	Ammonia (Well 3)
What is the number of observations in the set of background data (n_b)?	17
What is the number of observations in the set of monitoring data (n_m)?	17

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	0.1	79.3	0.002	115.196
2	0.1	56.4	0.002	148.037
3	0.1	72	0.002	11.785
4	0.1	81.2	0.002	159.591
5	0.05	82.8	0.010	202.577
6	0.18	5.17	0.001	4019.187
7	0.6	59.6	0.203	80.408
8	0.5	62.9	0.123	32.116
9	0.05	92.7	0.010	582.399
10	0.24	76.7	0.008	66.145
11	0.05	74.9	0.010	40.106
12	0.08	73.6	0.005	25.330
13	0.1	8.67	0.002	3587.658
14	0.1	74.6	0.002	36.396
15	0.06	141	0.008	5246.531
16	0.05	61.8	0.010	45.793
17	0.08	62.3	0.005	39.276
18			0.000	0.000
19			0.000	0.000
20			0.000	0.000

$X_b(ave) = 0.149$ $X_m(ave) = 68.567$

$T_b =$ 1.746 (from lookup table)

$T_m =$ 1.746

$s_b^2 =$ 0.025 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$

$s_m^2 =$ 902.408 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

$T_{star} =$ **9.390** $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

$W_b =$ 0.001 $= s_b^2/n_b$

$W_m =$ 53.083 $= s_m^2/n_m$

$T_{comp} =$ **1.746** $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is a significant increase in this parameter

Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number	VA0004031
Facility Name	Tyson Foods, Inc.-Glen Allen
Parameter	Ammonia (Well 4)
What is the number of observations in the set of background data (n_b)?	17
What is the number of observations in the set of monitoring data (n_m)?	17

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	0.1	10.7	0.002	0.029
2	0.1	8.4	0.002	6.098
3	0.1	12.1	0.002	1.514
4	0.1	10.9	0.002	0.001
5	0.05	15.5	0.010	21.442
6	0.18	32.6	0.001	472.218
7	0.6	11.7	0.203	0.690
8	0.5	11.5	0.123	0.398
9	0.05	13.9	0.010	9.184
10	0.24	11.4	0.008	0.282
11	0.05	10.2	0.010	0.448
12	0.08	7.45	0.005	11.692
13	0.1	0.67	0.002	104.028
14	0.1	5.5	0.002	28.831
15	0.06	7.12	0.008	14.058
16	0.05	7.32	0.010	12.598
17	0.08	7.82	0.005	9.299
18			0.000	0.000
19			0.000	0.000
20			0.000	0.000

$X_b(ave) = 0.149$ $X_m(ave) = 10.869$

$T_b =$ 1.746 (from lookup table)

$T_m =$ 1.746

$s_b^2 =$ 0.025 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$

$s_m^2 =$ 43.301 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

$T_{star} =$ **6.715** $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

$W_b =$ 0.001 $= s_b^2/n_b$

$W_m =$ 2.547 $= s_m^2/n_m$

$T_{comp} =$ **1.746** $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is a significant increase in this parameter

Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number: VA0004031

Facility Name: Tyson Foods, Inc.-Glen Allen

Parameter: BOD (Well 3)

What is the number of observations in the set of background data (n_b)? 17

What is the number of observations in the set of monitoring data (n_m)? 16

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	2	9	0.125	13.598
2	7	10	21.595	21.973
3	2	4	0.125	1.723
4	2	8	0.125	7.223
5	2	2	0.125	10.973
6	2	6	0.125	0.473
7	2	6	0.125	0.473
8	2	11	0.125	32.348
9	2	6	0.125	0.473
10	2	2	0.125	10.973
11	2	2	0.125	10.973
12	2	5	0.125	0.098
13	2	4	0.125	1.723
14	3	3	0.419	5.348
15	2	3	0.125	5.348
16	2	4	0.125	1.723
17	2		0.125	0.000
18			0.000	0.000
19			0.000	0.000
20			0.000	0.000

$X_b(ave) = 2.353$ $X_m(ave) = 5.313$

$T_b =$ 1.746 (from lookup table)

$T_m =$ 1.753

$s_b^2 =$ 1.493 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$

$s_m^2 =$ 8.363 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

$T_{star} =$ **3.788** $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

$W_b =$ 0.088 $= s_b^2/n_b$

$W_m =$ 0.523 $= s_m^2/n_m$

$T_{comp} =$ **1.751993185** $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is a significant increase in this parameter

Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number: VA0004031
Facility Name: Tyson Foods, Inc.-Glen Allen
Parameter: Chloride (Well 2)
What is the number of observations in the set of background data (n_b)? 17
What is the number of observations in the set of monitoring data (n_m)? 17

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	4	53	0.396	93.976
2	3	52	0.137	75.588
3	2	47	1.879	13.647
4	2	43	1.879	0.094
5	2.7	59.6	0.450	265.498
6	2.6	49.6	0.594	39.616
7	3	47	0.137	13.647
8	2	45	1.879	2.870
9	4	41	0.396	5.317
10	2	36	1.879	53.376
11	5	39	2.655	18.541
12	5	39	2.655	18.541
13	2	38	1.879	28.152
14	1	38	5.620	28.152
15	8	38	21.431	28.152
16	3	38	0.137	28.152
17	6	38	6.914	106.211
18		33	0.000	0.000
19			0.000	0.000
20			0.000	0.000

$X_b(ave)$ = 3.371 $X_m(ave)$ = 43.306

T_b = 1.746 (from lookup table)
T_m = 1.746

s_b^2 = 3.182 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$
s_m^2 = 51.221 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

T_{star} = 22.324 $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

W_b = 0.187 $= s_b^2/n_b$
W_m = 3.013 $= s_m^2/n_m$

T_{comp} = 1.746 $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is a significant increase in this parameter

Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number	VA0004031
Facility Name	Tyson Foods, Inc.-Glen Allen
Parameter	Chloride (Well 4)
What is the number of observations in the set of background data (n_b)?	17
What is the number of observations in the set of monitoring data (n_m)?	17

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	4	15	0.396	95.120
2	3	9	0.137	248.155
3	2	10	1.879	217.649
4	2	9	1.879	248.155
5	2.7	23.4	0.450	1.830
6	2.6	17.4	0.594	54.066
7	3	17	0.137	60.108
8	2	22	1.879	7.579
9	4	21	0.396	14.085
10	2	123	1.879	9652.485
11	5	26	2.655	1.555
12	5	20	2.655	22.590
13	2	20	1.879	22.590
14	1	19	5.620	33.096
15	8	29	21.431	18.038
16	3	20	0.137	22.590
17	6	20	6.914	22.590
18			0.000	0.000
19			0.000	0.000
20			0.000	0.000

$X_b(ave)$ = 3.371 $X_m(ave)$ = 24.753

T_b = 1.746 (from lookup table)

T_m = 1.746

s_b^2 = 3.182 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$

s_m^2 = 671.393 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

T_{star} = **3.394** $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

W_b = 0.187 $= s_b^2/n_b$

W_m = 39.494 $= s_m^2/n_m$

T_{comp} = **1.746** $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is a significant increase in this parameter

Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number: VA0004031

Facility Name: Tyson Foods, Inc.-Glen Allen

Parameter: COD (Well 3)

What is the number of observations in the set of background data (n_b)? 17

What is the number of observations in the set of monitoring data (n_m)? 17

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	7	45	151.145	435.336
2	24	72	22.145	37.642
3	31	60	137.028	34.395
4	19	119	0.087	2823.359
5	30	70.7	114.616	23.380
6	30	85	114.616	366.159
7	15	37	18.439	833.171
8	15	58	18.439	61.854
9	15	68	18.439	4.559
10	15	58	18.439	61.854
11	19	64	0.087	3.477
12	21	92	2.910	683.054
13	15	58	18.439	61.854
14	15	51	18.439	220.959
15	15	58	18.439	61.854
16	15	67	18.439	1.289
17	27	57	59.381	78.583
18			0.000	0.000
19			0.000	0.000
20			0.000	0.000

$X_b(ave)$ = 19.294 $X_m(ave)$ = 65.865

T_b = 1.746 (from lookup table)

T_m = 1.746

s_b^2 = 46.846 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$

s_m^2 = 362.049 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

T_{star} = **9.496** $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

W_b = 2.756 $= s_b^2/n_b$

W_m = 21.297 $= s_m^2/n_m$

T_{comp} = **1.746** $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is a significant increase in this parameter

Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number: VA0004031
Facility Name: Tyson Foods, Inc.-Glen Allen
Parameter: Nitrite (Well 2)
What is the number of observations in the set of background data (n_b)? 17
What is the number of observations in the set of monitoring data (n_m)? 17

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	0.01	0.01	0.001	0.001
2	0.01	0.01	0.001	0.001
3	0.01	0.01	0.001	0.001
4	0.01	0.01	0.001	0.001
5	0.05	0.05	0.000	0.000
6	0.01	0.01	0.001	0.001
7	0.11	0.02	0.005	0.000
8	0.02	0.02	0.000	0.000
9	0.07	0.02	0.001	0.000
10	0.02	0.02	0.000	0.000
11	0.05	0.34	0.000	0.091
12	0.14	0.03	0.011	0.000
13	0.02	0.02	0.000	0.000
14	0.02	0.02	0.000	0.000
15	0.02	0.02	0.000	0.000
16	0.02	0.02	0.000	0.000
17	0.02	0.02	0.000	0.000
18			0.000	0.000
19			0.000	0.000
20			0.000	0.000

$X_b(ave) = 0.036$ $X_m(ave) = 0.038$

$T_b =$ 1.746 (from lookup table)
$T_m =$ 1.746

$s_b^2 =$ 0.001 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$
$s_m^2 =$ 0.006 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

$T_{star} =$ **0.111** $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

$W_b =$ 0.000 $= s_b^2/n_b$
$W_m =$ 0.000 $= s_m^2/n_m$

$T_{comp} =$ **1.746** $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is no significant difference between the monitoring data and the background data

Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number	VA0004031
Facility Name	Tyson Foods, Inc.-Glen Allen
Parameter	Nitrite (Well 4)
What is the number of observations in the set of background data (n_b)?	17
What is the number of observations in the set of monitoring data (n_m)?	17

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	0.01	0.01	0.001	0.000
2	0.01	0.01	0.001	0.000
3	0.01	0.03	0.001	0.000
4	0.01	0.01	0.001	0.000
5	0.05	0.05	0.000	0.001
6	0.01	0.01	0.001	0.000
7	0.11	0.05	0.005	0.001
8	0.02	0.02	0.000	0.000
9	0.07	0.02	0.001	0.000
10	0.02	0.03	0.000	0.000
11	0.05	0.02	0.000	0.000
12	0.14	0.02	0.011	0.000
13	0.02	0.02	0.000	0.000
14	0.02	0.02	0.000	0.000
15	0.02	0.02	0.000	0.000
16	0.02	0.02	0.000	0.000
17	0.02	0.02	0.000	0.000
18			0.000	0.000
19			0.000	0.000
20			0.000	0.000

$X_b(ave) = 0.036$ $X_m(ave) = 0.022$

$T_b =$ 1.746 (from lookup table)

$T_m =$ 1.746

$s_b^2 =$ 0.001 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$

$s_m^2 =$ 0.000 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

$T_{star} =$ **-1.402** $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

$W_b =$ 0.000 $= s_b^2/n_b$

$W_m =$ 0.000 $= s_m^2/n_m$

$T_{comp} =$ **1.746** $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is no significant difference between the monitoring data and the background data or there is a failure of the assumption made for test validity

Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number VA0004031

Facility Name Tyson Foods, Inc.-Glen Allen

Parameter Nitrate (Well 3)

What is the number of observations in the set of background data (n_b)? 17

What is the number of observations in the set of monitoring data (n_m)? 17

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	0.4	0.5	0.046	0.125
2	0.6	0.3	0.172	0.024
3	0.4	0.1	0.046	0.002
4	0.3	1	0.013	0.729
5	0.18	0.09	0.000	0.003
6	0.1	0.03	0.007	0.014
7	0.02	0.02	0.027	0.016
8	0.15	0.17	0.001	0.001
9	0.06	0.02	0.016	0.016
10	0.02	0.02	0.027	0.016
11	0.02	0.02	0.027	0.016
12	0.03	0.02	0.024	0.016
13	0.16	0.02	0.001	0.016
14	0.15	0.08	0.001	0.016
15	0.16	0.02	0.001	0.004
16	0.11	0.04	0.006	0.016
17	0.29	0.04	0.011	0.011
18			0.000	0.011
19			0.000	0.000
20			0.000	0.000
				0.000

$X_b(ave)$ = 0.185 $X_m(ave)$ = 0.146

T_b = 1.746 (from lookup table)

T_m = 1.746

s_b^2 = 0.027 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$

s_m^2 = 0.065 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

T_{star} = -0.529 $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

W_b = 0.002 $= s_b^2/n_b$

W_m = 0.004 $= s_m^2/n_m$

T_{comp} = 1.746 $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is no significant difference between the monitoring data and the background data or there is a failure of the assumption made for test validity

Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number: VA0004031
Facility Name: Tyson Foods, Inc.-Glen Allen
Parameter: Sulfate (Well 2)
What is the number of observations in the set of background data (n_b)? 17
What is the number of observations in the set of monitoring data (n_m)? 17

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	5	5	282.319	417.842
2	5	6	282.319	377.959
3	5	6	282.319	377.959
4	5	9	282.319	270.312
5	0.6	14.5	449.540	119.709
6	173	21.2	22860.728	17.988
7	5	28	282.319	6.548
8	3	30	353.528	20.783
9	5	34	282.319	73.253
10	6	36	249.714	111.489
11	3	36	353.528	111.489
12	121	34	9840.173	73.253
13	4	34	316.924	73.253
14	5	34	282.319	73.253
15	18	34	14.458	73.253
16	3.7	41.1	327.695	245.199
17	3.34	29.7	340.858	18.138
18			0.000	0.000
19			0.000	0.000
20			0.000	0.000

$X_b(ave)$ = 21.802 $X_m(ave)$ = 25.441

T_b = 1.746 (from lookup table)
T_m = 1.746

s_b^2 = 2317.711 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$
s_m^2 = 153.855 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

T_{star} = **0.302** $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

W_b = 136.336 $= s_b^2/n_b$
W_m = 9.050 $= s_m^2/n_m$

T_{comp} = **1.746** $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is no significant difference between the monitoring data and the background data

Cochran's Approximation to the Behrens-Fisher Student's t-Test (at a 5% Level of Significance)

To use this spreadsheet, please fill in only the shaded boxes.

Permit Number VA0004031

Facility Name Tyson Foods, Inc.-Glen Allen

Parameter Sulfate (Well 4)

What is the number of observations in the set of background data (n_b)? 17

What is the number of observations in the set of monitoring data (n_m)? 17

	Background	Monitored Site	$[X_b-X_b(ave)]^2$	$[X_m-X_m(ave)]^2$
1	5	5	282.319	13.215
2	5	5	282.319	13.215
3	5	5	282.319	13.215
4	5	5	282.319	13.215
5	0.6	9.7	449.540	1.134
6	173	9.7	22860.728	1.134
7	5	5	282.319	13.215
8	3	6	353.528	6.945
9	5	15	282.319	40.509
10	6	8	249.714	0.404
11	3	3	353.528	31.757
12	121	33	9840.173	593.639
13	4	8	316.924	0.404
14	5	21	282.319	152.886
15	18	3	14.458	31.757
16	3.7	4.4	327.695	17.938
17	3.34	1	340.858	58.298
18			0.000	0.000
19			0.000	0.000
20			0.000	0.000

$X_b(ave)$ = 21.802 $X_m(ave)$ = 8.635

T_b = 1.746 (from lookup table)

T_m = 1.746

s_b^2 = 2317.711 $= [(X_{b1}-X_b(ave))^2+(X_{b2}-X_b(ave))^2...(X_{bn}-X_b(ave))^2]/(n_b-1)$

s_m^2 = 62.680 $= [(X_{m1}-X_m(ave))^2+(X_{m2}-X_m(ave))^2..(X_{mn}-X_m(ave))^2]/(n_m-1)$

T_{star} = **-1.113** $= [X_m(ave)-X_b(ave)]/sqrt(s_m^2/n_m + s_b^2/n_b)$

W_b = 136.336 $= s_b^2/n_b$

W_m = 3.687 $= s_m^2/n_m$

T_{comp} = **1.746** $= (W_b*T_b + W_m*T_m)/(W_b + W_m)$

There is no significant difference between the monitoring data and the background data or there is a failure of the assumption made for test validity